

# Space News Roundup

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National Aeronautics and Space Administration



NASA Deputy Director Dale Myers visited several JSC facilities during his recent one-day visit.

Above: Myers looks at research being done on auxiliary power units during a visit to JSC's Scanning Electron Microscopy Laboratory in Bldg. 13. Gail Horiuchi, far right, points out one feature of the analysis as Willard Castner, JSC Director Aaron Cohen, Henry Pohl, Director of Engineering, Daniel Nebrig, the Director's Executive Assistant, and Myers look on.



Right: Myers and his Executive Assistant, Susan Cloud, participate in a taste test with Nebrig at the Space Food Development Laboratory in Bldg. 17.

## 'Tire-kicking' visit

# Progress pleases confident Myers

Both the Space Shuttle and Space Station programs are making great strides and NASA Deputy Administrator Dale Myers is "very confident" Congress will support both programs, he said during a recent visit to Johnson Space Center.

Myers, here June 21 to "kick the tires" and meet with center officials, also said he is pleased with the Block 1 Space Station configuration and believes it will be a solid foundation for an evolving program.

"I am absolutely delighted with the way the director here at JSC and the directors at Marshall and KSC are working together absolutely as a team to get the Shuttle back together and flying again," Myers said.

"The schedules are going well," he added. "If we don't have a big failure in the SRM tests, we'll launch next June."

Myers said Rear Adm. Richard Truly, Associate Administrator for Space Flight, has a revised manifest moving well and that we plan to lock-in planetary mission windows for the Shuttle. He said the new drive for a mixed fleet will help solve the problem of DOD and science mission backlogs and allow the Shuttle to be more reserved for jobs that require humans in space.

After a briefing on Shuttle performance capability, Myers said he is convinced that development of an Advanced Solid Rocket Motor is extremely important.

Myers said he favors the Block 1 Space Station configuration because it will allow more flexibility. While the Block 2 additions would

support all of the user requirements identified in definition studies, he said, the cost is too high and needs may change.

"It is more likely in my mind that over a period of time we're going to find a different direction to go. People will decide there's more commercial opportunity, so we will evolve the space station in the direction of that additional opportunity. Or, there may be some major new activity in our new initiatives that would say, for example, we want to look more towards the Earth, or we may want to add structures to assemble elements to travel out beyond the low-Earth orbit capability," he said.

"The Space Station is a laboratory, and in all research laboratories you find that the direction develops with time. I think that's what we're going to find with Space Station. I think this is a good place to start the program."

Myers arrived for his periodic visit to JSC following a visit to the Dryden Flight Research Facility. From JSC, he went on to the National Space Technology Laboratories.

While at JSC, he had discussions with many program officials, toured the Space Food Development Laboratory in Bldg. 17, was briefed on the Orbiter/Space Station mating study and telerobotic assembly of the ACCESS structure by members of the Structures and Mechanics Division in Bldg. 13, and saw a demonstration of the Extravehicular Mobility Unit (EMU) in Bldg. 7.

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# Test validates solid rocket motor design changes

Analysis of data from the first in a series of full-scale solid rocket motor (SRM) test firings validates design changes that have been made, according to John Thomas, manager of the SRM design team at Marshall Space Flight Center.

Metal parts for STS-26 SRMs are in production, motor cases are "in house," and other parts are arriving from suppliers, he said.

"We are still pursuing some alternatives to those designs even

though we have high confidence in the primary design," Thomas said. "We have not found any reason to change the design — as a result of these test programs — to any substantial degree thus far."

Thomas reported the Engineering Test Motor 1A (ETM-1A) results in a July 16 briefing. He said subsequent tests are proceeding well, and that in spite of a tight schedule, "we're right on target for delivery of the motor and the test firings in between."

The first three segments of Development Motor 8 (DM-8) have been completed and checked for leaks, he said, and the fourth segment is being assembled in preparation for an August 26 test. Hardware for DM-9, scheduled for November, is in fabrication and insulation is being laid in the aft domes and cylinders.

Qualification Motor 6 (QM-6) is scheduled to be test fired in February 1988, he added, and QM-7 —

the first motor to be fired in a new Static Test Facility that will add dynamic loads and temperature stress to the Utah tests — is scheduled for March 1988.

A Pathfinder vehicle will be installed for the first test firing at the new, "essentially complete" Transient Pressure Test Article Facility at Marshall, he said.

Three Production Verification Motors will be test fired in April and May, he predicted.

In a related development, the first flight engine for STS-26 arrived June 30 for testing at the National Space Transportation Laboratories. The engine is now undergoing pre-test inspections. Boyce Mix, resident manager of Marshall's Shuttle Project Office, said the engine, which will make its first flight on STS-26, will be placed on the A-2 stand for a series of flight acceptance tests. The next flight engine is scheduled for delivery at NSTL in August.

# Space Station proposals roll in

## 'It's not just paper anymore'

Contractor proposals for both Space Station options were delivered to Johnson Space Center and other NASA centers during the past two weeks, a milestone that means the Station is on its way to being built.

"This is the part of the program where we actually begin to do the design, development, fabrication and testing," said Clarke Covington, Manager of the Space Station Projects Office. "This is where the real Space Station begins. It's not just paper anymore, we're getting into flight hardware."

At JSC, McDonnell Douglas and Rockwell International delivered their team packages for the full-up program, known as Option 2, to the Work Package 2

Source Evaluation Board (SEB) offices in the Vanguard Building on July 21. The packages for the two-phase program, known as Option 1, were delivered to the Vanguard Bldg. on July 28.

Contractors on the McDonnell Douglas team are Honeywell Aerospace and Defense, IBM Federal Systems Division, Lockheed Missiles and Space and RCA Communications and Information Systems Division. Rockwell's team consists of Grumman, Harris, Intermetrics, Sperry Aerospace, TRW and United Technologies.

In Option 1, the first phase will include the NASA laboratory and habitation modules, four resource nodes, the NASA polar-orbiting platform and experiment provisions

outside the pressurized modules. The second phase includes addition of the upper and lower truss structure, additional external payload attach points, the Solar Dynamic Power System, a free-flying co-orbiting platform and a servicing bay.

JSC will be responsible for detailed design, construction, test and evaluation of the structural framework; resource node outfitting; two airlocks; propulsion; external thermal management; communications and tracking; data management; guidance, navigation and control; external audio and video; interface between the Station and the Shuttle; assembly and external systems maintenance, and provisions for

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Mike Jordan, Space Station Marketing Manager for McDonnell Douglas, checks boxes off his list as van lines employee Ivory Cheeks wheels Space Station proposals out of a truck and into the Vanguard Bldg.

## Space News Briefs

### Scientists to study ozone hole

Scientists from NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Center for Atmospheric Research and other agencies and universities will leave for Chile on Aug. 12 to conduct an airborne study of the Antarctic ozone hole. Two NASA aircraft, a modified DC-8 and an ER-2 high altitude plane, will make up to 10 flights each through the ozone hole. Scientists hope to learn the cause of the hole and whether it is a naturally occurring or human-caused phenomenon.

### X-29 begins second phase of flying

The experimental forward-swept-wing X-29 aircraft has moved into the second phase of its flight research program at NASA's Ames-Dryden Flight Research Facility. The X-29, with its three-surface pitch control system — canards, wing flaps and strake flaps — was flown to about 1.5 times the speed of sound and to an altitude of 60,200 feet during the first phase of testing. During the second phase, researchers will further investigate the wing's structural divergence tendencies and the overall aerodynamic performance of the wings and canards.

### ESA Director General wins support

The Council of the European Space Agency (ESA) prolonged the mandate of Director General Prof. Reimar Lust by two years at its 78th session conducted June 22 and 23 in Paris. Lust, who began a four-year term in September 1984, now is expected to serve until August 1990.

### Pioneer of inertial navigation dies

Charles S. Draper, 85, a pioneer of inertial navigation who founded the laboratory that developed guidance systems used in Apollo, died July 25. He had suffered a stroke several months before, said Kathleen C. Granchelli, a spokesman for Draper Laboratory Inc. of Cambridge, Mass. Draper's work on the theory and technology of inertial navigation allowed aircraft, submarines, missiles and space vehicles to steer without relying on external sources of information. Draper Laboratory continues to work with JSC on the Space Shuttle backup flight system, remote manipulator system and Space Station.

## Bulletin Board

### Abrahamson to speak at "Soar '87"

Gen. James Abrahamson, Director of the Strategic Defense Initiatives Organization, will be keynote speaker for "Soar '87," a workshop on space operations automation and robotics scheduled Aug. 5-7 at the Gilruth Recreation Center. The three-day workshop is sponsored by JSC, the U.S. Air Force, University of Houston-Clear Lake and Universities Space Research Assoc. For more information, call Sandy Griffin, x38071, or Zafar Taqvi, 333-6544.

### Alley subscription program under way

The Alley Theatre corporate "Dinner and the Theatre" subscription program is again being offered to NASA and contractor employees. Ten open passes and 21 2-for-1 dinner certificates will be available from the EAA. Cost is \$109.90. Subscription forms are available from EAA representatives or from bulletin board flyers. The forms should be sent to Doris Wood, Mail Code FD14, before Sept. 30, or sent directly to the Alley Theatre. Call Wood at x37545 for more information.

### Astros vs. Braves tickets to be offered

Tickets to the Aug. 15 meeting of the Houston Astros and the Atlanta Braves will go on sale in the Bldg. 11 Exchange Store on Aug. 5. A limited number of seats will be available for \$6 each. You'll be required to show your NASA badge when you purchase tickets, and there will be a limit of eight tickets per purchase. These are the last tickets to be offered through the EAA this season.

### Astronomical artists show slides

JSC employees and the public are invited to attend a slide show featuring the work of several International Association of Astronomical Artists (IAAA) members at 1 p.m. Aug. 12 in the Bldg. 2 Teague Auditorium. IAAA President Kim Poor and many of the artists will be available to answer questions.

### Professional Secretaries to meet Aug. 12

Wills and probate will be the topic of the next meeting of the Clear Lake/NASA Area Chapter of Professional Secretaries International on Aug. 12 at the Holiday Inn on NASA Road 1. Dinner begins at 5:30 p.m., followed by the program and a 7 p.m. business meeting. Dinner reservations should be made with Carrol Cribbs, 488-7070. For more information, call Beverly Anderson, x32042, or Jessie Gilmore, x32739.

## New in the Library

The JSC Technical Library is located in Bldg 45, Room 100, and is open from 8 a.m. to 4:30 p.m. Monday through Friday. The general information number is x34240. New books received in the library as of July 14, 1987 include:

- All About Word Processors*, by Datapro.
- Analogue Signal Conditioning For Flight Test Instrumentation*, by D. W. Veatch.
- Analytical Ultrasonics in Materials Research and Testing*, by NASA.
- Artificial Intelligence With Statistical Pattern Recognition*, by E. A. Patrick.
- Challenger: A Major Malfunction*, by M. McConnell.
- Cybernetic Systems of Limb Movements in Man, Animals, and Robots*, by A. Morecki.
- Empirical Analysis for Expert Systems*, by P. Politakis.
- Human Body Composition: Growth, Aging, Nutrition, and Activity*, by G. B. Forbes.
- Industrial Numerical Analysis*, by S. McKee.
- Life Sciences Accomplishments*, by NASA.
- Microgravity Polymers: Proceedings of a Workshop*, by NASA.
- NASA Productivity Improvement and Quality Enhancement Program*, by NASA.
- Prescription for Disaster*, by J. J. Trento.
- Soviet Military Strategy in Space*, by N. L. Johnson.
- The ACS Style Guide: A Manual for Authors and Editors*, by M. C. Brogan.
- The Human Factor: Biomedicine in the Manned Space Program to 1980*, by J. A. Pitts.
- The 1987 Satellite Directory (Reference Use)*, by M. R. Kimmel.
- Top Management Strategy: What It Is and How to Make It Work*, by B. B. Tregoe.
- Transonic Aerodynamics*, by J. D. Cole.
- U. S. Missile Data Book, 1987*, by T. G. Nicholas.



Never mind what the barricade says, this workman was in up to his neck instead of up in the air between Bldgs. 2 and 13 at JSC recently. He was installing a backflow preventer for the lawn irrigation system as part of an ongoing program to prevent irrigation water from getting back into the regular water system. The below-ground device now is marked by a green circular cover in the lawn.

## NASA picks new Centers for Commercial Development of Space

Seven new teams have been selected by NASA to conduct pioneering research into areas promising to the commercial development of space.

The industry/university teams are eligible to receive up to \$1 million annually for the next 5 years to support research that could lead to new technologies commercially exploitable in space. This year's group includes the first Center for Commercial Development of Space to specialize in space propulsion, space power, life sciences and

materials for space structures. The new centers are:

- The University of Tennessee Space Institute - Center for Advanced Space Propulsion, Tullahoma, Tenn.
- Auburn University - Center for the Commercial Development of Space Power, Auburn, Ala.
- Environmental Research Institute of Michigan - Center for the Commercial Development of Autonomous and Man-Controlled Robotic

Sensing Systems in Space, Ann Arbor, Mich.

- Pennsylvania State University - Center for Secretion Research, University Park, Penn.
- University of Colorado - Center for Bioserve Space Technologies, Boulder, Colo.
- Case Western Reserve University - Center on Materials for Space Structures, Cleveland, Ohio.
- Texas A&M Research Foundation - Center for Commercial Development of Space Power, College Station, Texas.

## NASA keeps ambitious education goals

NASA's educational plans are as ambitious as its goals for the future because young people need to be continually challenged to assure American creativity and innovation, Dr. Robert W. Brown, Director of NASA's Educational Affairs Division told a gathering of the National School Public Relations Association recently.

Brown, speaking in San Antonio on July 15, also said it is time for six of the seven Teacher In Space finalists who have been on full-salaried contract with NASA for two years to return to their classrooms.

Barbara Morgan has accepted NASA's offer of the first opportunity to fly aboard the Shuttle when the manifest permits, he said. She will remain under contract with NASA Educational Affairs Division during the 1987-88 school year while teaching in her McCall, Idaho, elementary classroom, and make educational presentations as her schedule permits, he explained.

From the beginning of the Teacher In Space program, it was never

intended or anticipated that the program would take teachers out of the classroom permanently," he told the group.

The Teachers In Space have provided, and continue to provide a valuable service to the nation. They have conveyed hope to the country during a time of national crisis and they have served as role models and motivational resources for other teachers and students alike, and for the country as a whole," he said.

"We will continue to support the Teacher In Space program, with some natural modifications as the program matures," Brown said.

In addition, Brown said, his division's five-year plan extends in 13 other directions:

- Space Science Student Involvement Program;

• Aerospace Education Services Project;

- Science Fairs;
- Summer High School Apprenticeship Program;
- Urban Community Enrichment Program;
- NASA Education Workshop for Math and Science Teachers (NEWMAST);
- Educational publications;
- Interactive satellite broadcasts;
- Hubble Space Telescope planetarium show;
- University programs including the University Advanced Design Program, the Graduate Student Researchers Program, the Summer Faculty Fellowship Program, and the Resident Research Associateship Program;
- Special community programs; and
- Teacher Resource Centers."

Our objective is clear," Brown said, "to help ensure a future talent pool of scientists, engineers and other professionals needed for near-term and long-term requirements in the aerospace field."



Robert Brown

## Space Station proposals roll in

(Continued from page 1)  
extravehicular activities.

Marshall Space Flight Center received proposals for Work Package 1 from Martin Marietta Manned Space Systems and Boeing Aerospace Corp. Goddard Space Flight Center received a proposal for Work

Package 3 from General Electric's Astro Space Division. Lewis Research Center received a Work Package 4 proposal from Rockwell's Rocketdyne Division.

A detailed evaluation of the proposals will tie up 250 people on the SEB and its technical, cost,

and management committees until roughly the end of August, Covington said. The SEB, chaired by Max Engert, JSC's Deputy Director of Engineering, then will continue its analysis with an eye toward the scheduled goal of letting a contract in November.

## Progress pleases confident Myers

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"It's good to see our outstanding young engineers out in the labs doing what needs to be done," Myers said after his tour.

Myers ended the visit by briefing senior staff at the Gilruth Recreation Center. He discussed current projects, the future of America's space program and its effects on other countries.

"We've got a lot of people following us now and we're going to have to run hard to stay ahead," he said.

NASA  
Lyndon B. Johnson Space Center

## Space News Roundup



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Editor: Brian Welch  
Assistant Editor: Kelly Humphries

# CHARTING OUR FUTURE IN SPACE

## Looking ahead while we can still make changes

[Editor's note: Philip E. Culbertson, NASA's Associate Administrator for Policy and Planning, was the keynote speaker at the local Spaceweek Banquet on July 16. The following is an edited text of his speech.]

This has not been the best of NASA's years, and it's a considerable challenge for me to stand up and talk to you about charting our future in space when our future starts today. We know the things we must do, and many of them are being done right here in Houston.

I'd like to start by stealing a comment Aaron Cohen made to me today. He said that "We know our immediate jobs. They are the things that are necessary for your future. The job of getting the Shuttle flying again. The job of getting a vigorous start now on the Space Station. These are the necessary ingredients. But there are many others that must be added to that so that we have both the necessary and the sufficient."

If you'll accept with me the necessary, I'd like to concentrate on the sufficient. It is difficult to predict the precise course we ought to take, exactly how we will get there and how soon we will get there. I decided, therefore, to ask you to go through a 30-year time warp, think about the program as it might be in the year 2017 and, with 20/20 hindsight, look backward and figure out how we got there.

### July 16, 2017

It's July 16th, the year 2017. I have looked through what we have done this past year and what we expect to do next year. Perhaps one of the most notable things was the recent return of Cosmonaut Valdev and his crew members: three other Soviets, one Hungarian, two Germans, one Frenchman, two Englishmen and a Japanese. They returned from a year's stay at the International Lunar Base, which was proposed 30 years ago in October 1987 at the IAF (International Aeronautical Federation) meeting in Brighton. They were the third crew, staying there for a year, building up a lunar base for production of raw materials to be used as propellants and building materials in lunar orbit, Earth orbit and beyond.

Their landing will be matched in some respects by the coming launch of an unmanned cargo vehicle en route to Mars, where it will go into orbit and wait for the manned vehicle with a crew that has already been selected: three Soviets, two scientists from ESA, one Japanese and two astronaut-observers from the United States. The unmanned launch is to be on Ariane 8, the manned launch will be from the International Spaceport recently built in the eastern Soviet Union.

Just three weeks ago, the second 10-ton shipment of gallium arsenide crystals (used in microchip manufacturing) and it's now in the customs office in Tokyo, where it will re-enter Japanese industry. They had been manufactured on the space station Rising Sun. The Japanese also announced that the anticipated separation and purification of trimethyldiamate was turning out to be very successful in space, but they were not willing yet to say what it would be used for.

Before the end of the year, the United States expects to launch the two Solar Dynamic Power Systems, which will be added to the 10-year-old Block 1 Space Station launched in the mid-'90s.

Congress continues its debate on the proposed diameter for the primary reflector for the successor to the Hubble Space Telescope,

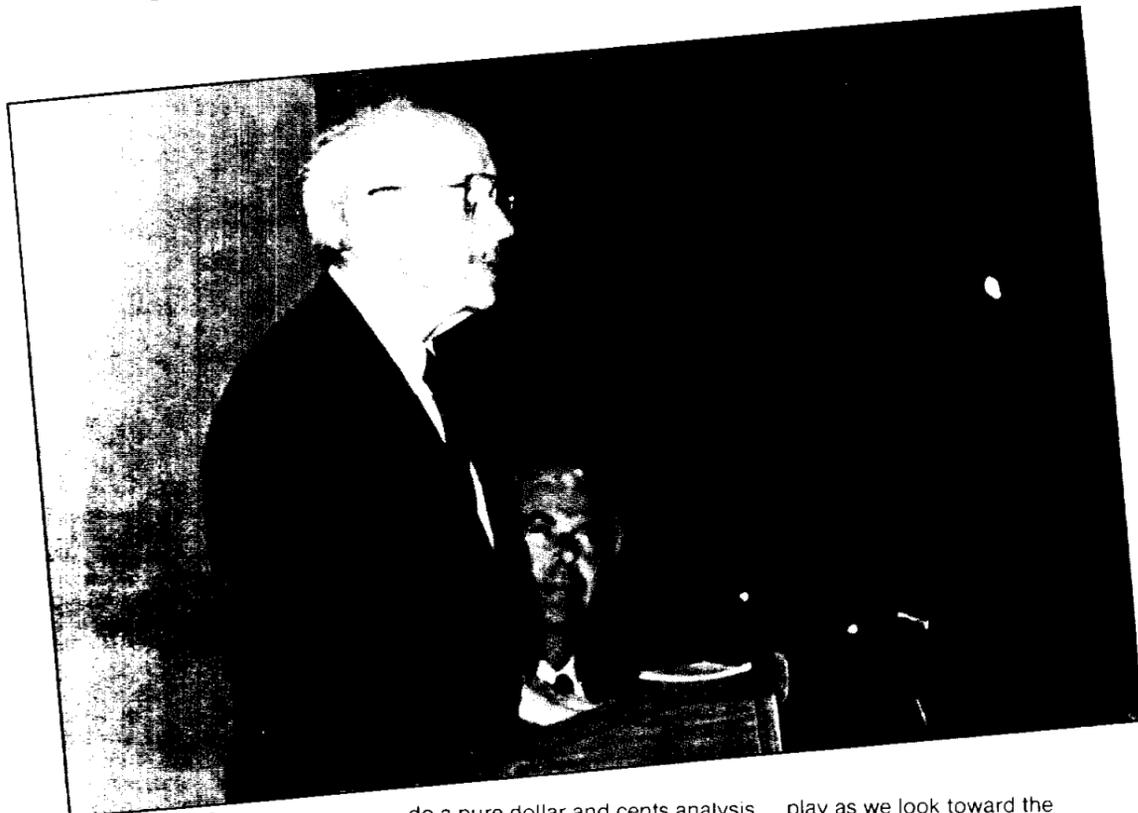


Photo by Don Carico

which died just five years ago after 24 successful years in orbit. The Gamma-ray Observatory and Advanced X-Ray Astronomical Facility are still operating after 25 years. Galileo 2 will be launched later on this year en route to Jupiter.

NASA announced that it planned to close another center, but refused to name which one.

Finally, the Library of Congress published an analysis titled, "Why the U.S. Space Program Essentially Died in the Year 2115 Following a 25-year Decline." The listed reasons for that decline:

First was the cost of launch vehicles and the rest of the space program that finally just costed NASA out of business. Second was the constant interagency infighting in Washington over jurisdiction of the space program. Third was the very conservative view of industry toward long-term space investments. Fourth was increasingly restrictive federal policy. Fifth was the relationship between the United States program and possibilities for foreign cooperation and the increasing foreign competition. Sixth was the lack of public will.

### July 16, 1987

Obviously I was jesting when I listed the 2017 program highlights; however, when I list the problems I am serious because I think those are the problems. But it is still the year 2017, and we can't rewrite history, so let's return to 1987 and talk about what might be done so that what I just forecast will, in fact, be wrong.

Let me talk about cost a little bit. When we developed the Shuttle, we sold it on the basis of a cost-effective transportation system and the total cost-effectiveness of it in purely economic terms. In retrospect, that was a mistake. It is more than just cost effectiveness. It is more than just the science return. Space is there to be used and space is there to be explored, and it is our destiny to do so. To have tried to

do a pure dollar and cents analysis was folly and will continue to be folly, but it is going to be difficult to explain in a way that can be generally accepted that exploration, science and national leadership cannot be measured on a cost-effectiveness standard. At the same time, however, we obviously must not cost ourselves out of the business.

### NASA must lead

The second point I mentioned was interagency infighting. There was a time when NASA clearly led the way in defining the destiny of the civil space program; and, as a matter of fact, that responsibility was spelled out in the Space Act in 1957. We went to the President and described a program that we thought was appropriate, and we debated it with OMB (Office of Management and Budget) and Congress. There was an involvement with the Department of Defense because we were normally using the same launch vehicles. So among NASA, DOD, OMB and the Congress, we worked out the program. No so today. Now when we seek to arrive at decisions like this we are joined by the Department of Transportation, Department of Commerce, the Office of Science and Technology Policy, the National Security Council, the Department of State and the Department of Treasury. It is time consuming, and it tends to result in what one would expect from a committee. We — NASA — must seek to reestablish a position where we are clearly in leadership of the intergovernmental debate on civil space issues.

Industry will remain conservative in its willingness to invest in the space program as long as we have the kinds of problems in basic economy that we have today. You can't get very entrepreneurial in a high-risk business when you're facing the kind of economics that you're facing today. There are some things, it seems to me, that we can do to reduce that risk, however. We can work together — industry and the government — so there is a better relationship between the roles the two of us

play as we look toward the commercial future of the space program. I hope we do so. I know we are making progress in some areas, but we must seek new areas for cooperative ventures in which the government does what it does best and the industry does what it does best.

We in Washington know two ways to deal with regulation, either deregulate or overregulate. Neither extreme is necessarily good for any of us. I think all of you would agree that deregulation of the telephone system has been a mixed, at best — and I hate to use the word — blessing. I feel somewhat the same about the deregulation of the airlines because I never know what I'm going to pay, and I'm not too terribly sure when I'm going to take off.

The government also overspecifies. We write our requests for proposals by specifying everything we want the industry to do, except apply some imagination and some creativity to the job we're asking be done. Our specifications on most things are too tight. We must come to a different understanding about how to develop products that are basically used by the federal government so that they draw the best of both industry and government.

### Reverse transfer

As far as cooperation and competition, I think our cooperative programs have been proceeding very well, and I look forward to many of them in the future. The thing that concerns me about it is that in the past we used to worry about technology transfer from us to them and now they're beginning to worry about technology transfer from them to us. That's quite a change and it's frightening. It is highly likely that as military competition slackens, economic competition with the Soviet Union will begin to increase. That's something we haven't talked too much about in the past.

The last of the things that I had mentioned earlier was the lack of public will and perhaps it would

appropriate to say there is a lack of the galvanizing of that public will to stand up in a unified way and say, "This is what we want." There is also a lack of expression on the part of NASA, the federal government and the industry of what that will should be supporting. I consider at least a significant piece of that to be NASA's job.

What we need to do is galvanize the American people into recognizing that this nation can choose to be the leader in space or we can choose that we will not. It's entirely up to us to decide. We have the money. We have the skills. We have the people. The only thing that is holding us back is that matter of will, and it is up to us — to you here in this room and a whole lot of thoughtful people like you — to steer the way for that expression of American determination.

### Recovery proof

Now let me turn to the near term. I think our recovery is proceeding extremely well. Sure, we've got some problems and a great deal of work to do, and we may or may not be able to launch precisely on the day that we hope to. NASA always schedules its activities on what we refer to as a success schedule and I think that's the right way to do it. The point to be made is that we are proceeding well on track toward getting back in space.

We are procuring expendable launch vehicles to supplement the Shuttle launch system, both to make it more flexible and a little bit deeper, but also because some versatility is needed. We may or may not elect to develop a Shuttle Derived Vehicle, which is a system using major components of the Shuttle to provide a heavy lift capability, something between 100,000 and 200,000 pounds. Next week we will be receiving proposals for the development of the Space Station, and we will proceed to evaluate them and get on with the design and development of that very significant new space system. Our launch manifest for the next four to five years of Shuttle operations is incredibly full as we restore the nation's space science program and fulfill our backlog of international commitments. We have much to do as we roll up our sleeves to move the civil space program forward.

NASA's credibility was understandably seriously damaged on that day almost a year and a half ago. As we take the necessary actions to resume Shuttle operations, we must do it in a manner that will clearly demonstrate to the American public and Congress to show that we have recovered well enough to undertake another new initiative. There's no question in my mind about that happening under the leadership of people like Aaron Cohen and his management team here in Houston, as well as, of course, NASA's other centers and the teams of contractors who work with us. And we must then be in a position that we can lay before the American public, the President and Congress a major new civil space objective for the beginning of the next millenium.

I would like to close with a quotation from H.G. Wells which, I feel, expresses the spirit that drives many of us — government, contractors and those of you who participate through your financial and moral support — in pursuit of the national civil space program. "For man there is no rest and no ending. He must go on conquest beyond conquest; and when he has conquered all the depths of space and all the mysteries of time, still he will be just beginning."

**"For man there is no rest and no ending. He must go on conquest beyond conquest; and when he has conquered all the depths of space and all the mysteries of time, still he will be just beginning."**

**— H. G. Wells**

# Roundup Swap Shop

All Swap Shop ads must be submitted on a JSC Form 1452. The forms may be obtained from the Forms Office. Deadline for submitting ads is 5 p.m. the first Wednesday after the date of publication. Send ads to Roundup, AP3, or deliver them to the Newsroom, Bldg. 2 Annex, Room 147. No phone in ads will be taken.

## Property & Rentals

Sale: Lake Livingston hwy. frontage lot, wooded, in Paradise Acres subdivision on FM 356, 8941.5 sq. ft. or .205 acre. Roger, x30093 or 472-5650.

Lease: 2-2 condo, W/D connection, pools, near daycare, low deposit, two weeks free, \$330/mo. 280-9822.

Sale: 3-2 country house, 1.33 acres, large carport, high efficiency A/C, deep well, all electric, 2 blocks off 518, near Hwy. 146, \$90,000. 334-1883.

Sale: 2.02 acres in Clear Creek Forest, near Magnolia, wooded, restricted, \$14,000. Laura, x31903 or 474-7072.

Lease: 2-1 condo on Clear Lake, 24 hrs. security, pool, tennis, \$400/mo. plus utilities. 480-5583 or 482-7156.

Sale: Four Crystal Beach lots on Bolivar, each 50' x 100', 921-7212.

Lease: CLC Camino South 4-2-2d, fenced, carpets, high efficiency A/C, no pets, references, deposit. 488-1301.

Lease: Bacliff Villas, 3-1-1, high efficiency A/C, fenced, no pets, references, deposit. 488-1301.

Sale/Lease: El Dorado Trace 2-2 condo, overlooking grass/pool, appliances, FPL, ceiling fan, security system, workout facilities, \$39,500 or \$420/mo. Dan, 480-6913 or 968-2422.

Sale: Sageglen, Perry 4-2-2, 2,204 sq. ft., large living room, ceiling fan, new A/C, wooded, Clear Lake schools, \$75,000. Sajjad, 282-3267 or 484-1820.

Sale: 1 acre, shaded, landscaped, plus 3-1-1, screened patio, deep well, cyclone fence, 38 mi. west of Memorial City, FM 362, \$50,000. Cookie, x30328 or 474-5610.

Sale: South Park Memorial cemetery lots, Sec. J, Lot 39, perpetual care, \$395/ea. Cookie, x30328 or 474-5610.

Lease: Oak Brook West/CLC, 4-2-5-2d, formal dining, FPL, new paint, wet bar, GDO, alarm system, \$795/mo. 482-6609.

Lease: Dixie Hollow/Pearland, 3-2-2, ceiling fan, inside utility room, refrigerator, \$495/mo. 482-6609.

Sale: 1/2 acre lot in Green Acres Webster, has all utilities, \$14,000. Boyd, x39415 or 332-4303.

Sale: Meadowgreen 3-2-2 w/study, all brick, fenced, drapes, ex. cond., \$78,900. 486-9224.

Sale/Lease: South Pasadena 3-1.5-2, wood fence, miniblinds, 1,100 sq. ft., near schools/shopping, \$440/mo. or \$430/mo. 487-1654.

Sale: Meadowgreen/CLC 4-2-2, corner lot, new carpet, six fans, trees, fenced, near pool and school, 2,200 sq. ft., \$97,500 OBO. 486-8157.

Lease: 3 BR townhome, 2 story corner unit, covered parking, fenced yard, pool, tennis, basketball, soon to have golf course, \$450/mo. 486-4466.

Lease: 2 BR condo on Seawall Blvd., fully furnished, Sept. 5-12, sleeps six, \$750. 486-4466.

Lease: Lake Livingston waterfront house, 3-2, sleeps 8, fully furnished, pier, fishing, skiing, swimming, weekend and weekly rates. 482-1582.

Lease: CLC 1 BR condo, microwave, fans, appliances, security, low deposit, two weeks free. Jim Briley, 282-1880 or 488-7901.

Sale: '77 mobile home, 2-2, set up at TAMU, 14' x 65', central A/H, new carpet, \$9,500. Doug, x30964 or 480-2929.

Lease: El Dorado Way condo, 1-1-1CP, W/D, appliances, ceiling fans, FPL, upstairs unit, \$300/mo. Steve, 954-1281 or 782-9386.

Lease: West Galveston Island beach house, 3-2, furnished, day/week. Ed Shumilak, x37686 or 482-7723.

Sale: Meadowbend 4-2-2 by owner, 1/3 acre at end of cul-de-sac split BR, drapes/miniblinds, garden, fruit trees, attic fans, fence, indoor utility room, assumable 10.5% FHA loan, \$71,900. Ann, x34475 or 538-3683.

Lease/Sale: CLC Baywind I, 2-1.5-2 upstairs condo, W/D, ceiling fans, fresh paint, carpet steam-cleaned, swimming pools, club, sauna, near shops/schools, variable length leases, option to buy, from \$325/mo. OBO. Lachman Das, x33235.

Lease: Alameda Mall area 3-1-1, ex. cond., fresh paint, ceiling fans, fenced, PISD, near school, \$395/mo. plus deposit. 479-1241.

Sale: Brook Forest 4-2-2, 2,100 sq. ft., walk to pool, park and schools; \$126,500, high equity assumable 9.75 loan. 480-4432.

Puerto Vallarta, Los Tullios condo, 1 or 2 weeks Oct. 17-31, sleeps 5, maid service, 2 baths, linens and dishes furnished, Have pictures, \$400/week, amenities of Hotel Fiesta Americana included. Alene, x35435 or 488-0795.

Sale/Lease: Camino South, 3-2-2, FPL, fenced, 1,550 sq. ft., formal dining rm., \$575/mo. or \$69,000. 486-0315.

Sale: Ellis Landing, 4-2.5-2, FPL, fenced, 2 story, near school, 2,350 sq.

ft., formal living rm., miniblinds, \$94,000. 332-4774.

Lease: CLC 2 BR condo, FPL, W/D connection, pools, all appliances, outside storage, \$350/mo. 486-0315.

Lease: Sycamore Valley 4-2-2, burglar bars, covered patio, landscaped, side yard, cul-de-sac. \$625/mo. plus deposit. Dilip, x31592 or 484-5343.

Sale: Clear Lake Shores 2 story "A" frame house, 2-2, loft/study, wooded lot, large deck, \$75,000. Suzy, 333-0957 or 538-1068.

Lease: Piper's Meadow, 3-2-2, custom blinds, free-standing FPL, formal dining rm., outside deck, fenced, security gate, near pool and tennis courts, \$600/mo. plus utilities. Diane, x35542 or 486-8687.

## Cars & Trucks

'79 Oldsmobile Cutlass station wagon, 64K mi., new tires and brakes, AM/FM stereo tape, \$2,200. 280-9822.

'81 Audi 4000E, mechanically sound, low mileage, \$3,300. OBO Tim, x37048 or 488-7154.

'80 Ford Fairmont station wagon, standard 4-spd., good cond., A/C, AM/FM stereo and cassette, 87K mi., \$1,450. Nellie, x34867 or 488-4828.

'84 Dodge 1-ton truck, crew cab, power, long wheel base, prospector pkg., 40K mi., camper w/stove, fridge, A/C included, \$9,500. Laura, x31903 or 474-7072.

'79 Chevy Monza, \$895 OBO. 488-4915.

'73 Mercury Comet, sell for parts only, rusty frame and body, good engine and interior. Bill, 282-2806 or 486-4150.

'78 Plymouth Horizon, 125K mi., \$600. 488-5544.

'74 Toyota Corona station wagon, \$500. Dean, x37761 or 488-7032.

'73 Dodge Motorhome, 26', self-contained, needs work, \$1,700. Boyd, x39415 or 332-4303.

Ford 9N tractor, new paint/rubber, engine refurbished, \$2,375. 585-0092.

'77 Pinto wagon, 4-spd. manual, \$500; '72 Ford van, \$600. 488-4383.

'85 Buick Park Avenue, loaded, original owner. \$12,000 OBO. 488-6590.

'84 Ford van club XLT., 52K mi., ex. cond., dual A/C, AM/FM cassette, tinted wrap windows, dual tanks, four captain's chairs, \$9,500. Richard, x31440 or 332-2381.

'57 Chevy, 283 cu. in., rebuilt PG, 4 dr. sedan, basket case, restorable, original parts, body in ex. cond., \$500. Ed, 280-4350.

'42 classic Army Jeep, original equipment, partially restored, \$3,000. Diane, x32300.

'78 Oldsmobile Calais, new headliner, rebuilt transmission, A/C, power windows, \$1,750. David, 282-3256.

'71 VW Super Beetle, good cond., owner maintained, engine overhauled and interior re-done in '78, 140K mi., \$950. Janine, 282-3035 or 480-9590.

'79 Camaro Berlinetta w/T-top, dent in side, make offer. 474-5403.

'80 Mazda RX7 GS, 5-spd., sun roof, AM/FM stereo w/tape deck, ex. cond., \$2,950. Lachman, x33235.

'69 Olds Cutlass, 350 CID, auto, PS, PB, good cond., new tires, starter and W/P, \$850 OBO. Merrill, x34925.

'85 Ford Bronco II, 4 wheel drive, AM/FM cassette, cruise, tilt, A/C, ex. cond., 33K mi. 559-1491.

'83 BMW 320i, sunroof, AM/FM cassette, A/C, good cond. Glen, 488-9080.

'79 Ford Fairmont Ghia, V-6, 4-dr., PS, PB, A/C. \$900 OBO. Clint, x39377 or 488-8919.

'82 Pontiac station wagon, PS, PB, power door and locks, A/C, AM/FM w/cassette, ex. cond., \$5,000 OBO. Dilip, x31592 or 484-5343.

'82 Datsun 280 Z, ex. cond., AM/FM stereo cassette, auto, A/C, T-top, louvers, four new tires, \$6,500. Lisa, x36905.

'69 Mach I, 351 c., Holley, headers, Torker intake, new paint and tires, interior in good cond., \$3,500. 326-3123.

## Boats & Planes

50 hp. Chrysler outboard w/control cables, \$285. Ben, 488-1326 or x31583. Canoe, 12', fiberglass, good cond., \$60. Carla, x30181.

Galaxy 15.5', walk-thru windshield boat, flasher depth finder, 85 hp. Johnson, \$1,200. Jody, 282-3155 or (409) 948-6128.

Windsurfer, beginner to intermediate, good cond., w/car rack, \$350. David, x31470 or 554-7463.

'86 Searay Seville 5.0/16.5', 140 hp. Mercruiser I/O, 75 hrs. freshwater only, full instrumentation, AM/FM stereo w/cassette, custom fit marine cover, regulation equipment, Sure Load Sportsman trailer, \$9,450, owner financing

available. Janine, 282-3035.

'86 Mistral Superlight Sailboard, sail, rig, w/Regatta Daggerboard, \$849 complete. Walt, x35939 or 280-8915.

18' catamaran, AMF Trac sailboat w/trailer and extras, like new, \$3,650. 333-3056.

16' canoe, Mohawk Blazer, fiberglass, wood seats, ex. cond. 946-6207.

15' Coleman canoe, paddles, car carrier, seat floats, \$200. 228-4051.

Airplane, 1/4 interest, Grumman Chee-tah, single engine, 4-seater, IFR equipped, auto gas STC, \$3,800. Suzy, 333-0957 or 538-1068.

## Cycles

'76 Honda Gold Wing, fairing, extra chrome, good cond., \$650. Bob, 282-2022, x412.

Arthur Fulmer full-face helmet w/two shields; Simpson model 61, full-face, \$75/ea. 282-3183/3155 or 482-2941 or (409) 948-6128.

'85 Honda V65 Sabre, 1100 cc., 1000 mi., \$2,600 or take over payment. Tony, x34404 or 538-1955.

## Audiovisual & Computers

Commodore 64 computer, 1541 disk drive, Gemini 10X printer, software, games, joystick, case, disks, \$300. Gene, x33369.

Atari 800 computer, 98K RAM, Atari 850 interface, Percom single floppy disk drive, Epson MX 80 FT dot matrix printer, plus software including Atari-writer, Visacalc spreadsheet, and games, \$200. Ed, x38862.

TI 99-4A computer w/17 cartridges (7 games, 8 educational, 1 utility, and Ext. Basic), all console/cartridge manuals, cassette I/F cable, one TI original cassette tape, \$65. Tim, x37066 or 280-9774.

Commodore 64 portable computer w/built-in 5 in. color monitor and disk drive, ex. cond., over 100 programs, modem and more, \$300. 487-3799.

Amiga software: One On One, Archon, Skyfox, Arcticfox, Halley Project, Wishbringer, Planetfall, \$20/ea. Joe, x31597 or 996-1667.

10-band Equalizer w/spectrum analyzer and stereo expander, Realistics best, still in box, \$90. Tom, x39842.

Z-80 Bigboard computer, dual 8" disk drives, monitor, keyboard, \$450. 334-4894.

HP digital cassette drive for HP-41C w/HP-IL Interface Module, ex. cond., \$450. Carlos, x38879 or 554-7727.

PC Jr Quadram Expansion Chassis, 512K, 2 disk drives, printer port, PC compatible, 300 baud internal modem, 83 key keyboard, joystick, complete docs, word processing, database, comm software, \$950. Robert, 480-6797 or x30780.

## Household

Dining room suite, antique, white French Provincial, table w/two leaves, 4 side and 2 captain's chairs, lighted china cabinet, \$500. 470-8720.

Two coffee tables, one is 35.5" sq., 15" high, light oak, like new, \$75; the other is 56" x 20" x 16", dark pecan, sturdy, \$35. 488-0323.

Hoover upright vacuum cleaner and attachments, good cond., \$30. Carla, x30181.

Desk and matching chair, birchwood, custom-made; several cabinets and corner desk, bookcase, dark wood; Living and dining room suites from Germany, bedroom set; Desk w/leather top, 100 yrs. old; Rosenthal china from Germany; 2 wrought iron tables, 4 chairs each; silver, crystal and glassware. 326-3095.

Electric dryer, Wards Heavy Duty 20, 7 yrs. old, \$80. Charles, x32213 or 487-2202.

Dining room set, octagon, and four high-backed Spanish chairs, \$150. Diane, x32300.

Sears Kenmore compact refrigerator, 3.6 cu. ft., model 94365, like new, \$100. Joe, x31597 or 996-1667.

Bedroom set: double bed, headboard upholstered in "Nettle Creek" yellow fabric, matching bedspread, white wicker chaise lounge w/matching cushions, side table, dresser w/mirror, yellow drapes, \$250 for all; Sewing machine cabinet, large, wood, 2-drawer, \$65. Moncrief, 333-3672.

Amana microwave, like new, \$175; Wards frostless refrigerator, \$100; Smith-Corona typewriter, \$50; King-size waterbed, \$75; vacuum, dinette table, 2 end tables, 4 office chairs. 474-5403.

Rocking chair, early American, needs upholstery work, \$15. 334-4894.

Five-piece French Provincial bedroom set w/twin size mattress, springs, \$300. 482-1228.

Corner group sleeper sofa and dining

table w/4 chairs, 1-1/2 yrs. old, ex. cond., both for \$800 OBO. Ramesh, 282-3494 or 484-3683.

Dining table w/4 chairs, \$95; Queen-size bed w/headboard and 3 nightstands \$250 OBO. Dilip, x31592 or 484-5343.

Mahogany full/queen size headboard, dresser w/mirror, chest of drawers, ex. cond., \$150; Rattan/glass coffee table, two end tables, ex. cond., \$150. Denise, 484-9180.

## Photographic

Canon lens for AE-1 cameras, FD 50 mm., 1:1.8, \$40; Canon AE-1 P Parte camera, \$35. Walt, x35939 or 280-8915.

Canon G3 w/f 1.7 40 mm. lens, auto/manual exposure, canonlite flash, case, \$80 OBO. Dennis, x34405 or 480-5076.

## Pets

Samoyed, female, gentle, free to good home, has all required shots, spayed. Jim, 282-3183 or 482-2941.

Bavarian Biermann puppies, AKC registered, 12 weeks old, blond, show caliber, house broken. Bruce, x32440.

Labrador pups, AKC registered, shots/wormed, parents on premises, black, \$150. 474-7011.

Alaskan Malamute puppies, AKC registered, shots, wormed, guaranteed champion bloodlines, Glacier's Stormcloud. Donald, (409) 925-4662.

Free male kitten, 9 weeks old, white w/blue eyes, Joan, x34618 or 486-1058.

## Musical Instruments

Spencer flute, closed hole, C concert, ex. cond., \$300. 488-6521.

5-piece Rogers drum set w/cymbals and extras, \$600 OBO. Sajjad, 282-3267 or 484-1820.

Baldwin Overture organ, "The Fun Machine," bench, all instruction manuals, like new, \$1,400. Tom, x39842.

## Lost & Found

Lost: gold I.D. rope bracelet w/"Dana" engraved on front and "12/25/70" on back, lost 7/10/87 in Bldg 1, 2 or 4, or in Visitors' parking lot. Dana, x38629.

Lost: earring w/three opals. Cindy, x37175 or 471-1844.

## Wanted

Want any items of NASA memorabilia, serious collector. Gene, 476-9080.

Want to buy electric trains. Don, x37832 or 996-1425.

Want full-time male bowler for fall JSC men's league, 6 p.m. Thursdays, Alpha Lanes. Gary, x36865 or 488-1537.

Junior Astronaut Corps seeks volunteers to help with Space Camp preparations; Space Program orientation camp, tickets available through Sept. '87. 778-4183.

Guitarist seeks a few good rock musicians to jam with. Tom, x33659 or 532-2209.

Want "N" gauge model railroad equipment, new and used acceptable, will pay fair price. Roger, x31947 or 996-7454.

Want washer and dryer, ex. cond., less than 4 yrs. old, white or gold. David, x37016 or 486-4887.

Want '79 Ford truck shop manuals. Don, x38869 or 488-1432.

Want male roommate to share 3-2-2 home in walking distance from STSOC, \$200/mo. plus share of utilities. Jon, 282-3489 or 486-9407.

## Miscellaneous

310 gal. laminated, fiberglass spa, includes 1.5 hp. pump and air compressor w/250 BTU pool heater. \$3,400. Arthur, x36607.

Sears 2 hp. air compressor, 20 gal. tank, \$135. Ben, 488-1326 or x31588.

Hydraulic brake bleeding tank w/adaptor for American cars, \$35; Wheelchair, \$40; 10-spd. bike, Sears Free Spirit, \$40; High-voltage probe, \$10. Andy, x31596 or 488-5534.

Patio furniture: 2 white, tubular, steel chaise lounges w/2 matching chairs, all have overstuffed dacron cushions, in ex. cond., \$75 for all. Michael, x33206.

Ladies' solitaire diamond ring, platinum body, .43 carats, appraised \$1,350, want \$700 firm, appraisal available; Pearson compound crossbow, 250 lbs. pull, leather belt pouch, 12 specially made pear-shaped hunting heads, want \$300 firm or will trade for Tamron 60-300 zoom lens, ex. cond. only. Harold, x38497.

Baseball cards, 1914, 15 Cracker Jack, 30 miscellaneous, includes H. Wagner, W. Johnson, T. Speaker, etc., cond. varies, appraised at approx. \$300, will negotiate. Steve, x38593 or 474-5205.

Antenna rotator, model AR-40, electronic control box, \$75; Drop seeder spreader, ex. cond., \$20; One-way mirror, 48" x 82.5", \$30. 921-7212.

Boston Fern hanging baskets. Merrifield, 333-2437.

Sears 20". 3.5 hp. lawn mower, used eight hrs., like new, \$140. J. Homick, x37108 or 486-8463.

.357 magnum Blackhawk Ruger, 4.5" barrel w/western holster and belt, \$275 OBO. John, 472-7779.

Radio-controlled off-road racer, 1/10th scale car, 2 battery packs, charger, two-channel radio, \$80; DP 300 rowing machine, ex. cond., \$30. Carla, x30181.

Corvette accessories: sheepskin seat cover, armrest, front-end cover, car cover, and wheel spinners; Whirlpool upright freezer, 16.1 cu. ft., \$150. Cindy, x34165.

King-size waterbed w/headboard and heater, \$156.43 OBO. 480-7413.

Dehumidifier, electric, \$75; Golf cart, 8 yrs. old, battery operated, \$400 as is. Elaine, x31805.

Assorted black lights and fixtures. Bob Allgeier, 488-0397.

Sears exercise bike, like new, BO. Lew, x33741.

Vitamaster exercise bike, like new, \$50 OBO; Vitamaster Model #500 Multi-Action Gym, rowing machine (tension action), \$50 OBO. Peggy, x36577.

Pair of antique, carved, upholstered throne chairs, \$500; antique treadle sewing machine, \$85; antique window seat, upholstered, \$250; Four dining room